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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/078,473

02/21/2002

Hoki Kwon

V637-02992 US

4854

22913

7590

03/28/2005

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EXAMINER

NGUYEN, DUNG T

ART UNIT

PAPER NUMBER

2828

DATE MAILED: 03/28/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/078,473

Applicant(s)

KWON, HOKI

Examiner

Dung (Michael) T. Nguyen

Art Unit

2828

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 21 December 2004.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-21 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-21 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>01/28/05</u> | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Response to Arguments

Applicant's arguments with respect to claims 1-21 have been considered but are moot in view of the new ground(s) of rejection.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claim 8 is rejected under 35 U.S.C. 102(b) as being anticipated by Bedair et al. (H667). Bedair disclose in Fig.2 a p-doped GaAs(1-x)Sbx tunnel junction layer 203 (col.7, l.16-17).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-7 and 9-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bedair et al. (H667) in view of McDermott et al. (Growth and doping of GaAsSb via metalorganic chemical vapor deposition for InP heterojunction bipolar transistors in Appl. Phys. Lett., Vol.68, No. 10, 4 March 1996).

With respect to claims 1-2, Bedair disclose in Fig.2 a tunnel junction including GaAs(1-x)Sbx 203 (col.7, l.16-17). Bedair lack a substrate in an MOCVD chamber between 500 C and 650 C. McDermott teach a substrate in an MOCVD chamber (page 1386, second column, line 11-12) between 500 C and 600 C which meet the claim limitation of between 500 C and 650 C (page 1386, second column, line 5). For the benefit of manufacturing a reliable tunnel junction layer in a VCSEL, it would have been obvious to one having ordinary skill in the art at the time the invention was made to provide Bedair what is taught by McDermott.

With respect to claims 5-7, McDermott disclose TEGa, CCl₄ (p.1386, first col., fourth para., l.5-6), TMSb, and AsH₃ (p.1386, second col., l.14).

With respect to claim 9, McDermott disclose the GaAsSb layer is doped with carbon with a concentration greater than $1 \times 10^{19} \text{ cm}^{-3}$ (page 1386, first column).

With respect to claim 10, McDermott disclose the InP layer (page 1387, second column, line 3).

With respect to claim 11, Bedair disclose the tunnel junction is less than about 10 nm thick (col.5, l.37).

With respect to claims 3-4 and 12, McDermott disclose the x value of 0.5 (page 1386, second column, line 11).

Claims 13-15, 18, and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bedair et al. (H667) in view of the admitted prior art.

With respect to claims 13 and 18, Bedair disclose in Fig.2 a tunnel junction including $\text{GaAs}(1-x)\text{Sb}_x$ 203 (col.7, l.16-17). Bedair lack the InGaAsP active region having a plurality of quantum wells. Prior art teaches in Fig.1 the InGaAsP active region 20 having a plurality of quantum wells. For the benefit of obtaining a

VCSEL with long wavelength using the tunnel junction, it would have been obvious to one having ordinary skill in the art at the time the invention was made to provide Bedair what is taught by Prior art.

With respect to claims 14-15, the prior art shows in Fig.1 a bottom DBR 16, a bottom spacer 18, an active region 20, a top spacer 22, and a top DBR 24.

Claims 16-17 and 19-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bedair et al. (H667) in view of the admitted prior art and further in view of McDermott et al. (Growth and doping of GaAsSb via metalorganic chemical vapor deposition for InP heterojunction bipolar transistors in Appl. Phys. Lett., Vol.68, No. 10, 4 March 1996).

With respect to claim 16, Bedair and Prior art disclose all limitations of the claim except for the MOCVD. McDermott teach the MOCVD (p.1386, third para.). For the benefit of manufacturing a tunnel junction for a long wavelength VCSEL, it would have been obvious to one having ordinary skill in the art at the time the invention was made to provide Bedair and Prior Art what is taught by McDermott.

With respect to claim 17, McDermott disclose the GaAsSb layer is doped with carbon with a concentration greater than $1 \times 10^{19} \text{ cm}^{-3}$ (page 1386, first column).

With respect to claim 19, McDermott disclose the InP layer (page 1387, second column, line 3).

With respect to claim 20, McDermott disclose the x value of 0.5 (page 1386, second column, line 11).

With respect to claim 21, Bedair disclose the tunnel junction is less than about 10 nm thick (col.5, 1.37).

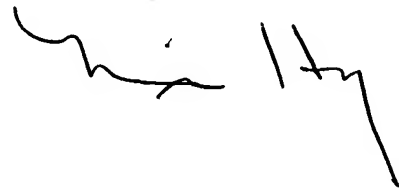
Communication Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Dung (Michael) T Nguyen whose telephone number is (571) 272-1949. The examiner can normally be reached on 8:30 - 17:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Min Harvey can be reached on (571) 272-1835. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 306-3329.

Michael Dung Nguyen



MINGUN CHHIMNEY
PRIMARY EXAMINER